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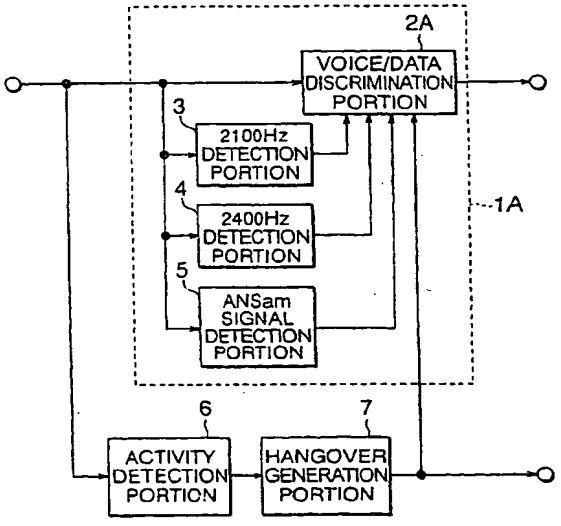
(54) Method, apparatus and transmission equipment for signal discrimination

(57) The signal discrimination result is prevented from becoming the "voice" during the transmission of the modem signal by the V.34 modulation system.

The 2400 Hz detection portion for detecting the 2400 Hz tone signal from the input signal, the ANSam signal detection portion for detecting the specific signal used in the start-up procedure of the V.34 modem signal from the input signal and the voice/data discrimination portion for classifying the type of the input signal based on the outputs of the 2400 Hz detection portion and the ANSam signal detection portion are provided, and in the case where the specific signal has not been detected, the signal discrimination result in the case where the 2400 Hz tone signal is detected is made to be the voice state, while in the case where the specific signal has been detected, the signal discrimination result in the case where the 2400 Hz tone signal is detected is not made to be the voice state.

FIG. 1



1A : SIGNAL DISCRIMINATION PORTION

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this ADPCM system is used, it is desirable that which encoding bit rate is selected is decided by whether the input signal is the voice signal or the voice-band data signal. In other words, in the case where the input signal is the voice signal, it is better to select a lower encoding bit rate, within the range of maintaining good speech quality for communication, for efficiently using the line. In this case, the encoding bit rate can be 32 kbit/s or lower. On the other hand, in the case where the input signal is the voice-band data signal, the higher encoding bit rate of 40 kbit/s is necessary so as not to cause a transmission error. In this way, in order to adequately set the encoding bit rate of the encoding portion 21, the voice/data discrimination portion 2 is necessary for judging whether the input signal is the voice signal or the voice-band data signal.

[0013] In the DCME shown in FIG. 15, the voice/data discrimination portion 2 judges whether each input signal S20 of M channels is the voice signal ("voice") or the voice-band data signal ("data"), and the judgment result thereof is sent to the transmitting control portion 23, and based on this judgment result, the transmitting control portion 23 notifies the encoding portion 21 about the control information regarding the encoding bit rate of the encoders so that the encoding bit rate of the encoders in the encoding portion 21, which is assigned to the channels judged to be the "data", is set to 40 kbit/s, and the encoding bit rate of the encoders in the encoding portion 21, which is assigned to the channels judged to be the "voice", is set to any one of 32 kbit/s, 24 kbit/s, 16 kbit/s.

[0014] The transmitting control portion 23 also notifies the frame assembling portion 22 about the control information regarding the assignment of the encoded signals of each channel outputted from the encoding portion 21 to the predetermined bits in the DCME frame, and the frame assembling portion 22 performs the assignment of the above described encoded signals of each channel to the above described bits in the DCME frame based on the control information and transmits the assembled data of the DCME frame S22 to the opposed equipment side.

[0015] Further, the transmitting control portion 23 transmits the control information S23 to the opposed equipment side regarding the assignment of the input signals of M channels to the encoders, the encoding bit rate in the ADPCM encoding, and the assignment of the encoded signals to the bits in the DCME frame.

[0016] Note that the voice/data discrimination portion 2 inputs the output of the 2100 Hz detection portion 3, the output of the 2400 Hz detection portion 4 and the output of the receiving control portion 31, and resets the judgment result to the "voice" or "data" based on these signals.

[0017] First, the 2100 Hz detection portion 3 judges whether a tone signal of the 2100 Hz exists or not in the input signals S20 by performing a process such as a frequency analysis for the input signals S20, and outputs "1" when the 2100 Hz tone signal exists and outputs "0" when it does not exist as a 2100 Hz detection result. The voice/data discrimination portion 2 inputs the 2100 Hz detection result, and when the 2100 Hz tone is detected, sets the judgment result to the "data".

[0018] Further, the 2400 Hz detection portion 4 judges whether the tone signal of the 2400 Hz exists or not in the input signals S20 by performing a process such as the frequency analysis for the input signals S20, and outputs "1" when the 2400 Hz tone exists and outputs "0" when it does not exist as a 2400 Hz detection result. The voice/data discrimination portion 2 inputs the 2400 Hz detection result, and when the 2400 Hz tone is detected, resets the judgment result to the "voice".

[0019] Further, the voice/data discrimination portion 2 inputs a discrimination state of the receiving side signal from the receiving control portion 31, and when a leading edge from "0" (voice) to "1" (data) of the discrimination state of the receiving side signal is detected, sets its judgment result to the "data".

[0020] Next, the action of the receiving unit 30 of the DCME shown in FIG. 15 will be described.

[0021] The receiving control portion 31 receives various types of the control information S31 transmitted by the transmitting control portion of the opposed equipment side, and based on various types of the control information, transmits the control information to the frame disassembling portion 32 and the decoding portion 33.

[0022] Further, the receiving control portion 31 judges whether the discrimination state of the receiving side signal is the "voice" or the "data" based on the received control information S31 regarding the encoding bit rate of the ADPCM encoding and outputs the result to the voice/data discrimination portion 2. This output is used for setting to the "data" of the judgment result in the voice/data discrimination portion 2 as described earlier.

[0023] The frame disassembling portion 32 receives the control information regarding the assignment of the bits in the DCME frame received from the opposed equipment side to the encoded data outputted to the decoding portion 33, and based on this control information, disassembles the DCME frame S32 received from the opposed equipment side and outputs the encoded signal to the decoding portion 33.

[0024] Next, the decoding portion 33 receives the control information regarding the encoding bit rate of each channel and the control information regarding the assignment of the m number of decoders in the decoding portion 33 to the outputs of M channels from the DCME, and based on these control informations, assigns the encoded signals received from the frame disassembling portion 32 to any one of the m number of decoders 33 so as to be decoded by an adequate encoding bit rate and assigns the decoded signals of each channel to any one of M channels of the outputs from the DCME and outputs them as output signals S33.

[0025] In recent years, transmission rate of a facsimile

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[0037] The signal discrimination apparatus according to the invention of claim 5 is a signal discrimination apparatus, which uses the third detection means for detecting a tone signal of the specific frequency from the above described input signal instead of the above ANSam signal detector.

[0038] The signal discrimination apparatus according to the invention of claim 6 is a signal discrimination apparatus, wherein the tone signal of the specific frequency which the above described third detection means detects is the tone signal of 2100 Hz.

[0039] The signal discrimination apparatus according to the invention of claim 7 is a signal discrimination apparatus, wherein the above described second detection means is a V.21 modem signal detector for detecting a V.21 (channel No. 2) modem signal of the V.8 procedure.

[0040] The signal discrimination apparatus according to the invention of claim 8 is a signal discrimination apparatus, wherein the above described second detection means is a JM signal detector for detecting a JM signal in the V.8 procedure.

[0041] The signal discrimination apparatus according to the invention of claim 9 is a signal discrimination apparatus, wherein the above described second detection means is an INFO0a signal detector for detecting an INFO0a signal in the start-up procedure.

[0042] The signal discrimination apparatus according to the invention of claim 10 comprises an activity detector for judging an active/inactive state of the above described input signal, wherein, after the specific signal used in the start-up procedure of the modem signal has been detected, when the inactive state continues for a predetermined time, a detection state of the above described specific signal is initialized.

[0043] The signal discrimination apparatus according to the invention of claim 11 comprises a first activity detector for judging the active/inactive state of a transmitting side signal, a second activity detector for judging the active/inactive state of a receiving side signal, wherein, after the specific signal used in the start-up procedure of the modem signal has been detected, when both the transmitting side and the receiving side continue to be in an inactive state for a predetermined time, the detection state of the above described specific signal is initialized.

[0044] The signal discrimination apparatus according to the invention of claim 12 comprises a continuity check test tone detector for detecting the tone signal of the specific frequency sent for the purpose of the continuity check test of the channel from the above described input signal, wherein, after the specific signal used in the start-up procedure of the above described modem signal has been detected, when the tone signal of the specific frequency sent for the continuity check test of the above described channel is detected, the detection state of the above specific signal is initialized.

[0045] The signal discrimination apparatus according to the invention of claim 13 is a signal discrimination apparatus, wherein the tone signal of the specific frequency which the above described first detection means detects is a tone signal of 2400 Hz.

[0046] The signal discrimination method according to the invention of claim 14, in the signal discrimination method for classifying the type of the input signal into two types of the voice and the data, includes: a first step of detecting the tone signal of the specific frequency from the above described input signal; a second step of detecting the specific signal used in the start-up procedure of the modem signal from the above described input signal; and a third step of setting a specific signal detection flag when the above specific signal is detected, wherein, when the above described specific signal detection flag is not set, the signal discrimination result in the case of the tone signal of the above described specific frequency being detected is made to be the voice state, and when the above described specific signal detection flag is set, the signal discrimination result in the case of the tone signal of the above specific frequency being detected is not made to be the voice state.

[0047] The signal discrimination method according to the invention of claim 15 is a signal discrimination method, wherein the above described start-up procedure is the V.34 procedure.

[0048] The signal discrimination method according to the invention of claim 16 is a signal discrimination method, wherein the above described start-up procedure is the V.8 procedure.

[0049] The signal discrimination method according to the invention of claim 17 is a signal discrimination method, wherein the above described specific signal is the ANSam signal in the V.8 procedure.

[0050] The signal discrimination method according to the invention of claim 18 is a signal discrimination method, wherein the above specific signal is the V.21 (channel No. 2) modem signal in the V.8 procedure.

[0051] The signal discrimination method according to the invention of claim 19 is a signal discrimination method, wherein, the above specific signal is the INFO0a signal in the start-up procedure.

[0052] The signal discrimination method according to the invention of claim 20 is a signal discrimination method, wherein, after the specific signal used in the start-up procedure of the above described modem signal has been detected, when both the transmitting side and the receiving side continue to be in an inactive state for a predetermined time, the detection state of the above described specific signal is initialized.

[0053] The signal discrimination method according to the invention of claim 21 includes a fourth step of detecting the tone signal of the specific frequency sent for the purpose of the continuity check test of the channel from the above described input signal, wherein, after the specific signal used for the start-up procedure of the above described modem signal has been detected, when the tone signal of the specific frequency sent for the purpose of the continuity check test of the above de-

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[0066] The hangover generation portion 7 performs a hangover generation processing which maintains an active state during a predetermined time after the change from the active state to inactive state of the output of the activity detection portion 6, and outputs the active/inactive judgment result after the hangover generation processing to the voice/data discrimination portion 2A. It is necessary that this hangover time (the above described predetermined time) is set to the value longer than an inactive duration during the transmission of the V.34 modem signal so that the active state is maintained during the transmission of the V.34 modem signal.

[0067] The voice/data discrimination portion 2A performs, for example, the analysis of the zero-crossing rate and the signal strength for the input signal so as to judge whether the type of the input signal is a voice signal ("voice") or a voice-band data signal ("data") and outputs the judgment result.

[0068] Further, the voice/data discrimination portion 2A inputs the judgment result of each portion of the 2100 Hz detection portion 3, the 2400 Hz detection portion 4, the ANSam signal detection portion 5 and the hangover generation portion 7 and performs the resetting of a signal discrimination state to the "voice" or the "data" according to the inputted judgment result.

[0069] The voice/data discrimination portion 2A first sets the signal discrimination state to the "data" in the case where the 2100 Hz tone is detected.

[0070] Further, in the case where the 2400 Hz tone is detected, when the ANSam signal has already been detected, the voice/data discrimination portion 2A judges that it is the tone of 2400 Hz sent in a data call by the V.34 modem and sets the signal discrimination state to the "data". On the other hand, in the case where the ANSam signal has not yet been detected, the voice/data discrimination portion 2A judges that it is not the tone used in the data call by the V.34 modem, but, for example, the tone signal of 2400 Hz used in a line signalling of No. 5 signalling or a channel check test, and rests the signal discrimination state to the "voice".

[0071] The judgment result of the active/inactive state from the hangover generation portion 7 is used for detecting the end of data call by the V.34 modem in the voice/data discrimination portion 2A.

[0072] FIG. 2 is a flowchart to explain the action of the voice/data discrimination portion 2A.

[0073] When the voice/data discrimination portion 2A starts the processing, it first checks the present signal discrimination state (step ST1), and in the case where the state is a "voice" state, advances to step ST2, and in the case where the state is a "data" state, advances to step ST7.

[0074] First, in the case where the present signal discrimination state is the "voice", the voice/data discrimination portion 2A performs, for example, the analysis of the zero-crossing rate and the signal strength for the input signal so as to judge the presence or absence of the voice-band data signal (VBD) (step ST2), and in the case where the voice-band data signal is detected, sets the signal discrimination state to the "data" (step ST3), and completes the processing.

[0075] In step ST2, in the case where the voice-band data signal is not detected, next, the voice/data discrimination portion 2A checks the judgment result of the presence or absence of the 2100 Hz tone inputted from the 2100 Hz detection portion 3 (step ST4), and in the case where the 2100 Hz tone is detected, sets the signal discrimination state to the "data" (step ST3), and completes the processing.

[0076] In step ST4, in the case where the 2100 Hz tone is not detected, next, the voice/data discrimination portion 2A checks the judgment result of the presence or absence of the ANSam signal inputted from the ANSam signal detection portion 5 (step ST5), and in the case where the ANSam signal is detected, sets a specific signal detection flag to 1 (step ST6), and completes the processing.

[0077] In step ST5, in the case where the ANSam signal is not detected, the processing completes leaving the discrimination state as it is.

[0078] Next, in the case where the present signal discrimination state is "data", the voice/data discrimination portion 2A performs, for example, the analysis of the zero-crossing rate and the signal strength for the input signal so as to judge the presence or absence of the voice signal (step ST7), and in the case where the voice signal is detected, resets the signal discrimination state to the "voice" (step ST8), and completes the processing.

[0079] In step ST7, in the case where the voice signal is not detected, next, the voice/data discrimination portion 2A checks the judgment result of the presence or absence of the ANSam signal inputted from the ANSam signal detection portion 5 (step ST9), and in the case where the ANSam signal is detected, sets the specific signal detection flag (step ST10).

[0080] Next, the voice/data discrimination portion 2A checks the judgment result of the active/inactive state after the hangover generation processing inputted from the hangover generation portion 7 (step ST11), and in the case where the hangover time has expired and the state becomes inactive, clears the specific signal detection flag to zero (step ST12).

[0081] Next, the voice/data discrimination portion 2A checks the judgment result of the presence or absence of the 2400 Hz tone inputted from the 2400 Hz detection portion 4 (step ST13), and in the case where the 2400 Hz tone is detected, subsequently checks the state of the specific signal detection flag (step ST14), and in the case where the specific signal detection flag is not set to 1 (specific signal has not been detected yet), resets the signal discrimination state to the "voice" (step ST15), and completes the processing.

[0082] In step ST13, in the case where the 2400 Hz tone is not detected, the processing completes leaving the discrimination state as it is.

[0083] FIG. 3 is a view for explaining the action in the

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nel check test, and resets the signal discrimination state to the "voice".

[0101] The judgment result of the active/inactive state from the hangover generation portion 7 is used for detecting the end of the data call by the V.34 modem in the voice/data discrimination portion 2B.

[0102] FIG. 5 is a flowchart for explaining the action of the voice/data discrimination portion 2B. Except for step ST9b in the drawing, the action is the same as the action of the above described embodiment 1 described by using FIG. 2.

[0103] In the above described first embodiment (FIG. 2), in steps ST5 and ST9, the voice/data discrimination portion 2A checks the judgment result of the presence or absence of the ANSam signal inputted from the ANSam signal detection portion 5, and in the case where the ANSam signal is detected, set the specific signal detection flag to 1. However, in the present embodiment (FIG. 5), in step ST9b, the voice/data discrimination portion 2B checks the judgment result of the presence or absence of the V.21 channel No. 2 modem signal inputted from the V.21 channel No. 2 modem signal detection portion 8, and in the case where the V.21 channel No. 2 modem signal is detected, sets the specific signal detection flag to 1.

[0104] FIG. 6 is a drawing for explaining the action in the case where the V.34 modem signal is inputted to this signal discrimination portion 1B, and shows a state of each portion in the case where the output signal of the V.34 answer modem is inputted to this signal discrimination portion 1B.

[0105] In the drawing, when the answer modem sends the ANSam signal, since the ANSam signal is an amplitude-modulated tone signal of 2100 Hz and has a large power component at 2100 Hz, the 2100 Hz detection portion 3 detects the 2100 Hz tone, and in this way the voice/data discrimination portion 2B sets the discrimination result to the "data" state (steps ST3, ST4).

[0106] After that, since the JM signal modulated by the V.21 channel No. 2 system is sent from the answer modem, the V.21 channel No. 2 modem signal detection portion 8 detects the V.21 channel No. 2 modem signal, and the specific signal detection flag is set (steps ST9b, ST10).

[0107] After that, since the 2400 Hz tone is sent from the answer modem, the 2400 Hz detection portion 4 detects the 2400 Hz tone, but since the specific signal detection flag is already set, the resetting of the signal discrimination state to the "voice" is not performed and the "data" state is maintained (steps ST13, ST14).

[0108] When the transmission of this V.34 modem signal completes, and after that, the inactive duration continues for more than a predetermined time, since the output of the hangover genearation portion 7 becomes an inactive state, the specific signal detection flag is cleared to zero (steps ST11, ST12).

[0109] As described above, in the present embodiment, means for detecting the V.21 channel No. 2 modem signal in the V.8 procedure, as the specific signal to be used in the start-up procedure of the V.34 modem signal, is provided, and in the case where the V.21 channel No. 2 modem signal has been detected, the signal discrimination state is not reset to the "voice" even if the 2400 Hz tone is detected, so that there is the effect of preventing the signal discrimination result from becoming the "voice" during the transmission of the modem signal by the V.34 modulation system.

Third Embodiment

[0110] In the above described second embodiment, means for detecting the V.21 channel No. 2 modem signal in the V.8 procedure, as the specific signal to be used in the start-up procedure of the V.34 modem signal, is provided, and in the case where the V.21 channel No. 2 modem signal has been detected, the signal discrimination state is not reset to the "voice" even if the 2400 Hz tone is detected. However, a configuration is also available wherein the V.21 channel No. 2 modem signal is demodulated, and the demodulated data is analyzed, and when a synchronization bits of the JM signal is detected a specified signal detection flag is set so that the signal discrimination state is not reset to the "voice" even if 2400 Hz tone is detected.

[0111] By so doing, similar to the above described second embodiment, there is the effect of preventing the signal discrimination result from becoming the "voice" during the transmission of the modem signal by the V.34 modulation system.

Fourth Embodiment

[0112] In the above described first and second embodiments, means for detecting the signal (ANSam signal or V.21 channel No. 2 modem signal) in the V.8 procedure, as the specific signal to be used in the start-up procedure of the V.34 modem signal, is provided, and in the case where the signal in the V.8 procedure has been detected, the signal discrimination state is not reset to the "voice" even if the 2400 Hz tone is detected. However, not only the signal in the V.8 procedure, but also other signal used in the start-up procedure of the V.34 modem signal, that is, the INFO0a signal may be detected.

[0113] FIG. 7 is a block diagram showing the fourth embodiment of the invention.

[0114] In the drawing, 1C denotes a signal discrimination portion, 2C a voice/data discrimination portion as discrimination means, 3 a 2100 Hz detection portion, 4 a 2400 Hz detection portion, 6 an activity detection portion, 7 a hangover generation portion, and 9 an INFO0a signal detection portion as second detection means. Note that, here, the components 1C, 6 and 7 substantially constitute a signal discrimination apparatus.

[0115] Next, the action of FIG. 7 will be described.

[0116] The actions of the 2100 Hz detection portion

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generation portion. Note that, here, components 1D, 6 and 7 substantially constitute the signal discrimination apparatus.

[0134] Next, the action of FIG. 10 will be described.

[0135] The actions of the 2100 Hz detection portion 3, the 2400 Hz detection portion 4, the activity detection portion 6 and the hangover generation portion 7 are the same as those of the first embodiment.

[0136] The voice/data discrimination portion 2D performs, for example, the analysis of the zero-crossing rate and the signal strength for the input signal so as to judge whether the type of the input signal is a voice signal ("voice") or a voice-band data signal ("data") and outputs the judgment result.

[0137] Further, the voice/data discrimination portion 2D inputs the judgment result of each portion of the 2100 Hz detection portion 3, the 2400 Hz detection portion 4 and the hangover generation portion 7 and performs the resetting of a signal discrimination state to the "voice" or the "data" according to the inputted judgment result.

[0138] The voice/data discrimination portion 2D first sets the signal discrimination state to the "data" in the case the 2100 Hz tone is detected.

[0139] Further, in the case where the 2400 Hz tone is detected, when the 2100 Hz tone signal has already been detected, the voice/data discrimination portion 2D judges that it is the 2400 Hz tone sent in a data call by the V.34 modem and sets the signal discrimination state to the "data". On the other hand, in the case where the 2100 Hz tone signal has not yet been detected, the voice/data discrimination portion 2D judges that it is not the tone used in the data call by the V.34 modem, but, for example, the tone signal of 2400 Hz used in a line signalling of No. 5 signalling or a channel check test, and resets the signal discrimination state to the "voice".

[0140] The judgment result of the active/inactive state from the hangover generation portion 7 is used for detecting the end of the data call by the V.34 modem in the voice/data discrimination portion 2D.

[0141] FIG. 11 is a flowchart for explaining the action of the voice/data discrimination portion 2D.

[0142] When the voice/data discrimination portion 2D starts the processing, it first checks the present signal discrimination state (step ST1), and in the case where the present signal discrimination state is a "voice" state, advances to step ST2, and in the case where the present signal discrimination state is a "data" state, advances to step ST7.

[0143] First, in the case where the present signal discrimination state is the "voice", the voice/data discrimination portion 2D performs, for example, the analysis of the zero-crossing rate and the signal strength for the input signal so as to judge the presence or absence of a voice-band data signal (VBD) (step ST2), and in the case where the voice-band data signal is detected, sets the signal discrimination state to the "data" (step ST3) and completes the processing.

[0144] In step ST2, in the case where the voice-band data signal is not detected, next, the voice/data discrimination portion 2D checks the judgment result of the presence or absence of the 2100 Hz tone inputted from the 2100 Hz detection portion 3 (step ST4), and in the case where the 2100 Hz tone is detected, sets the specific signal detection flag to 1 (step ST6), sets the signal discrimination state to the "data" (step ST3b), and completes the processing.

[0145] In step ST4, in the case where the 2100 Hz is not detected, the processing completes leaving the discrimination state as it is.

[0146] Next, in the case where the present signal discrimination state is "data", the voice/data discrimination portion 2D performs, for example, the analysis of the zero-crossing rate and the signal strength for the input signal so as to judge the presence or absence of the voice signal (step ST7), and in the case where the voice signal is detected, resets the signal discrimination state to the "voice" (step ST8), and completes the processing.

[0147] In step ST7, in the case where the voice signal is not detected, next, the voice/data discrimination portion 2D checks the judgment result of active/inactive state after the hangover generation processing inputted from the hangover generation portion 7 (step ST11), and in the case where the hangover time has expired and the state becomes inactive, clears the specific signal detection flag to zero (step ST12).

[0148] Next, the voice/data discrimination portion 2D checks the judgment result of the presence or absence of the 2400 Hz tone inputted from the 2400 Hz detection portion 4 (step ST13), and in the case where the 2400 Hz tone is detected, subsequently checks the state of the specific signal detection flag (step ST14), and in the case where the specific signal detection flag is not set to 1 (specific signal has not been detected yet), resets the signal discrimination state to the "voice" (step ST15), and completes the processing.

[0149] In step ST13, in the case where the 2400 Hz tone is not detected, the processing completes leaving the discrimination state as it is.

[0150] FIG. 12 is a drawing for explaining the action in the case where the V.34 modem signal is inputted to this signal discrimination portion 1D, and shows a state of each portion in the case where the output signal of the V.34 answer modem is inputted to this signal discrimination apparatus.

[0151] In the drawing, when the answer modem sends the ANSam signal, since this ANSam signal is an amplitude-modulated tone signal of 2100 Hz and has a large power component at 2100 Hz, the 2100 Hz detection portion 3 detects the 2100 Hz tone, and in this way the voice/data discrimination portion 2D sets the specific signal detection flag and sets the discrimination result to the "data"(steps ST3b, ST4, ST6).

[0152] After that, since the 2400 Hz tone is sent from the answer modem, the 2400 Hz detection portion 4 detects the 2400 Hz tone, but since the specific signal detection flag is already set, the resetting of the signal dis-

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activity detection portion 6 in the transmitting unit 20A of the DCME.

[0170] The activity detection portion 6 performs the judgment as to whether each input signal S20 of M channels is active or inactive and outputs the judgment result to the hangover generation portion 7. The hangover generation portion 7 performs the hangover generation processing as described in the above described first embodiment, and outputs the active/inactive judgment result of each channel after the hangover generation processing to the voice/data discrimination portion 2F and the transmitting control portion 23.

[0171] The signal discrimination portion 1F performs the judgment as to whether each input signal S20 of M channels is the voice signal ("voice") or the voice band data signal ("data") and outputs the judgment result to the transmitting control portion 23. The detail of the action in the signal discrimination portion 1F is as described in the above described first embodiment. However, the voice/data discrimination portion 2F in the signal discrimination portion 1F inputs the discrimination state of the receiving side signal from the receiving control portion 31, and in the case where a leading edge of the discrimination state of the receiving side signal from the "voice" to the "data" is detected, sets the judgment result to the "data".

[0172] The encoding portion 21 has the m number (m is value smaller than M) of encoders and encodes the input signal in a low bit rate encoding fashion according to the instruction of the transmitting control portion 23 and outputs the encoded signal. As for an encoding algorism used by this encoding portion 21, there is, for example, an Adaptive Differential Pulse Code Modulation (hereinafter, referred to as ADPCM) system which is prescribed in the ITU-T Recommendation G.726, and in this ADPCM system, the input signal at a bit rate of 64 kbit/s can be encoded into any bit rate of 40 kbit/s, 32 kbit/s, 24 kbit/s, 16 kbit/s.

[0173] The transmitting control portion 23 assigns the channels judged to be active among the input signals S20 of M channels to the m number of encoders in the encoding portion 21 at a first priority based on the judgment result of the voice/data state and the judgment result of the active/inactive state, and further instructs the encoding portion 21 to set the encoding bit rate of the channels judged to be the "data" to 40 kbit/s and the encoding bit rate of the channels judged to be the "voice" to any one of 32 kbit/s, 24 kbit/s and 16 kbit/s.

[0174] Further, the transmitting control portion 23 notifies the frame assembling portion 22 about the control information regarding the assignment of the encoded signals of each channel outputted by the encoding portion 21 to the bits in a predetermined DCME frame, and the frame assembling portion 22 performs the assignment of the above described encoded signals of each channel to the bits in the above described DCME frame based on the control information and transmits the assembled data of the DCME frame S22 to the opposed equipment side.

[0175] Further, the transmitting control portion 23 transmits the control information S23 to the opposed equipment side regarding the assignment of the input signals of M channels to the encoders, the encoding bit rate in the ADPCM encoding, and the assignment of the encoded signals to the bits in the DCME frame.

[0176] The receiving control portion 31 in the receiving unit 30 of the DCME receives various types of the control information S31 which is sent from the transmitting control portion of the opposed equipment side, and based on the various types of the control information, outputs the control information to the frame disassembly portion 32 and the decoding portion 33.

[0177] Further, the receiving control portion 31 judges whether the discrimination state of the receiving side signal is the "voice" or the "data" based on the received control information S31 regarding the encoding bit rate of the ADPCM encoding and notifies the voice/data discrimination portion 2F about the judgment result.

[0178] The frame assembly portion 32 receives from the receiving control portion 31 the control information regarding the assignment of the bits in the DCME frame received from the opposed equipment side to the encoded data outputted to the decoding portion 33, and based on this control information, analyzes the DCME frame S32 received from the opposed equipment side and outputs the encoded signal to the decoding portion 33.

[0179] Next, the decoding portion 33 receives the control information regarding the encoding bit rate of each channel and the control information regarding the assignment of the m number of decoders in the decoding portion 33 to the outputs of M channels from the DCME from the receiving control portion 31, and based on the control information, assigns the encoded signals received from the frame disassembling portion 32 to any of the m number of decoders in the decoding portion 33 and decodes them at an adequate encoding bit rate, and assigns the decoded signals from each channel to any of M channels of the outputs from the DCME, and outputs them as output signals S33.

[0180] As described above, in the present embodiment, means for detecting the specific signal used in the start-up procedure of the V.34 modem signal in the signal discrimination apparatus is provided, and in the case where the above described specific signal has been detected, the signal discrimination state is not reset to the "voice" even if the 2400 Hz tone is detected, so that the signal judgment result is prevented from becoming the "voice" during the transmission of the modem signal by the V.34 modulation system and so there is the effect of being able to obtain the transmission equipment capable of normally transmitting the V.34 modem signal.

Ninth Embodiment

[0181] In the above described embodiments 1-8,

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FIG. 1

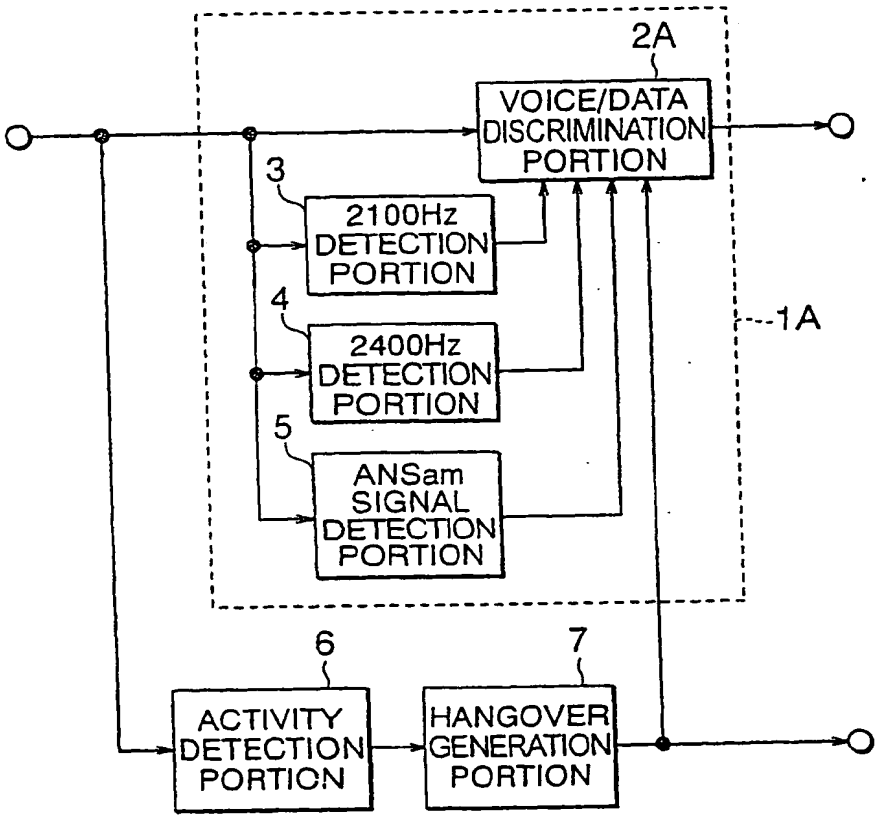

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FIG. 3

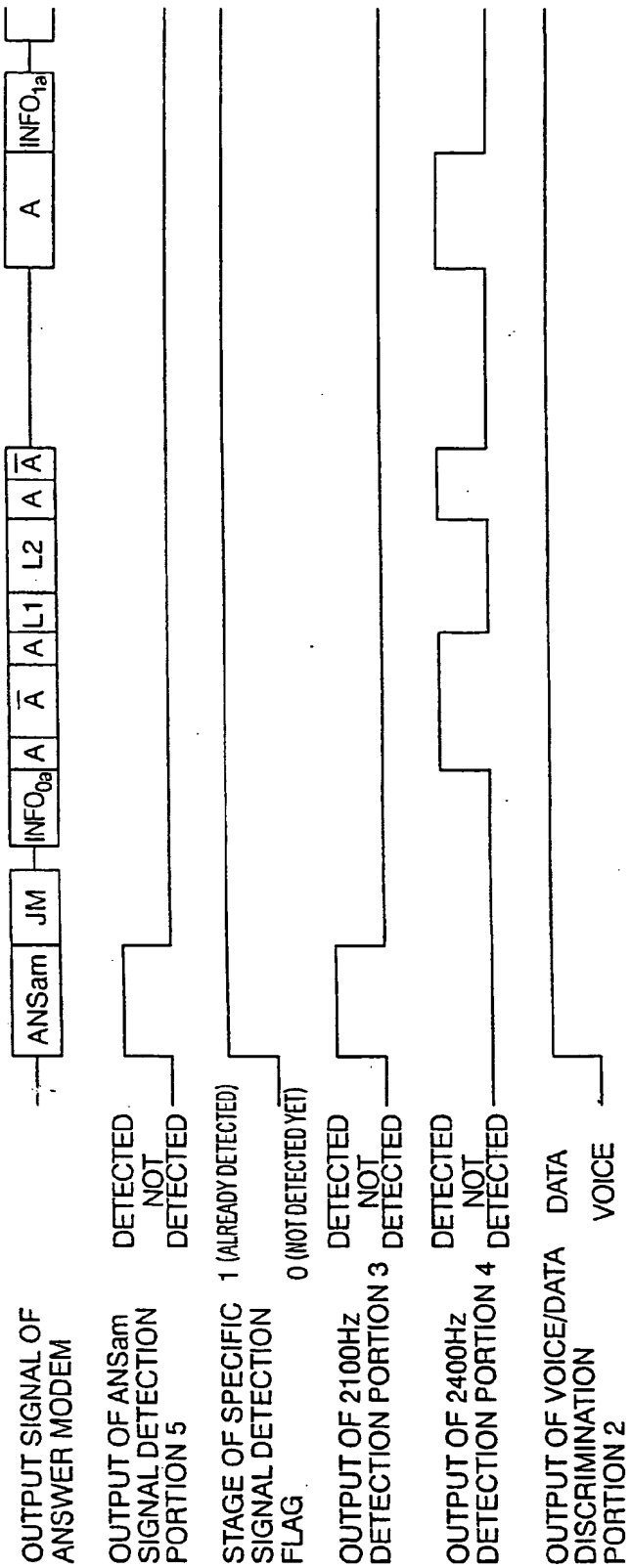

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FIG. 5

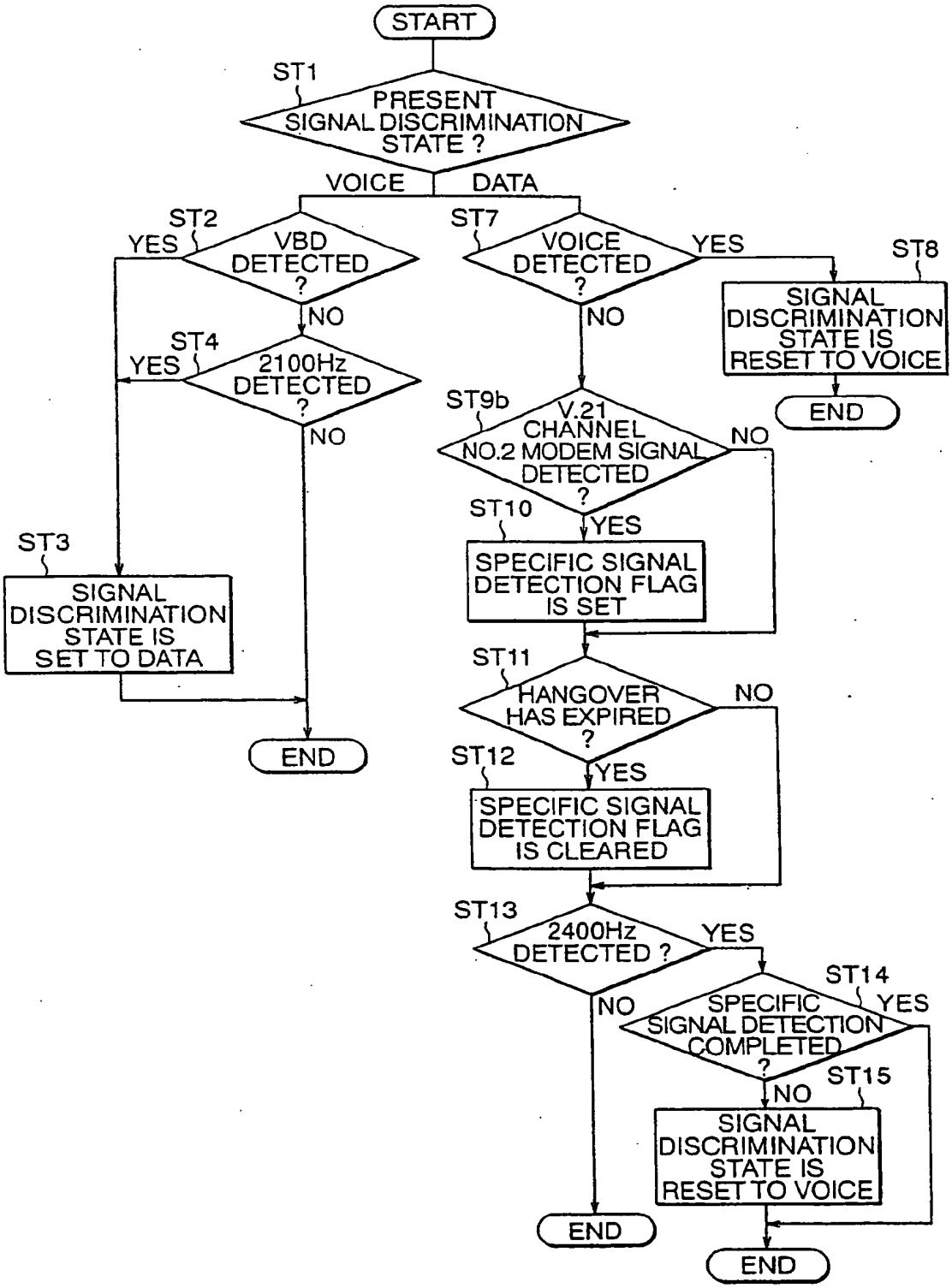

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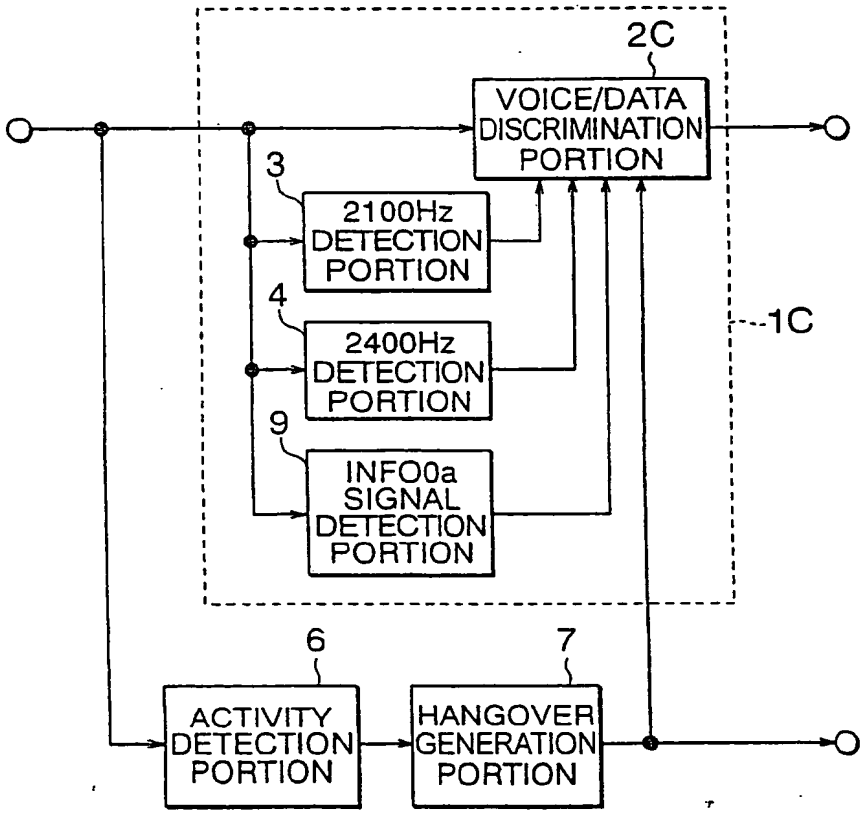
FIG. 7



1C : SIGNAL DISCRIMINATION PORTION

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FIG. 9

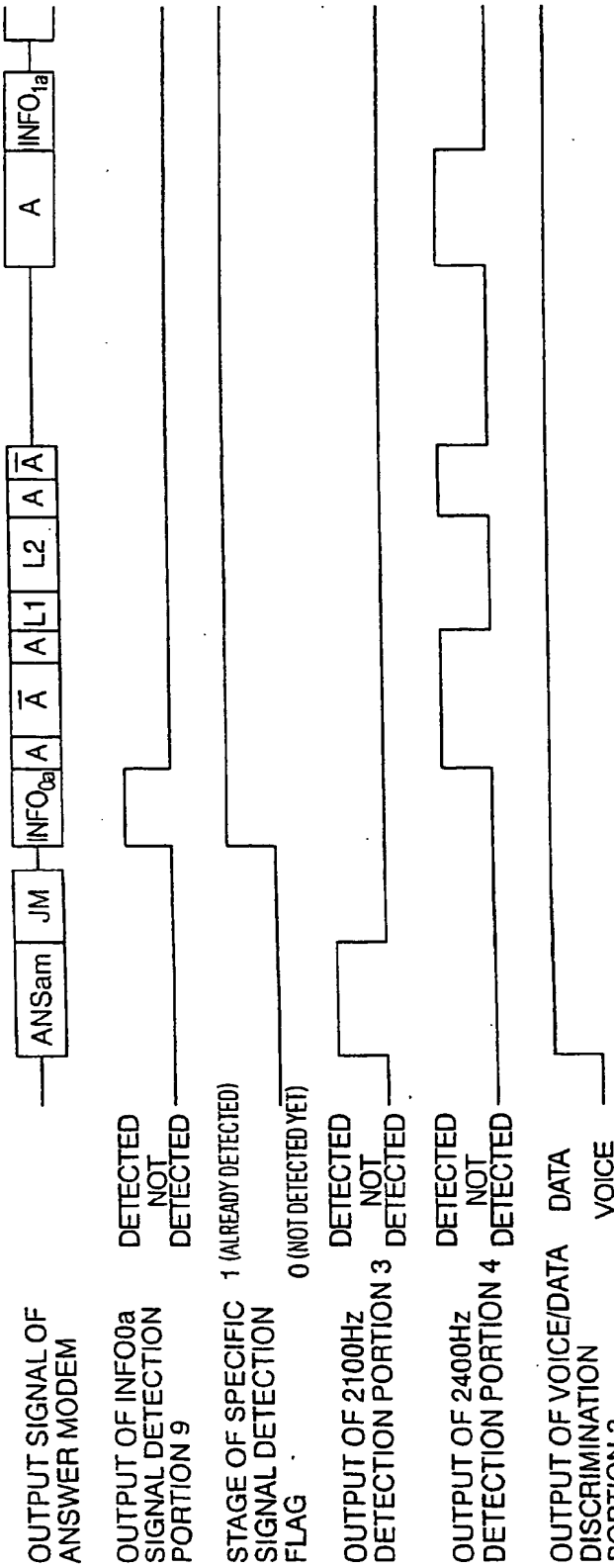

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FIG. 11

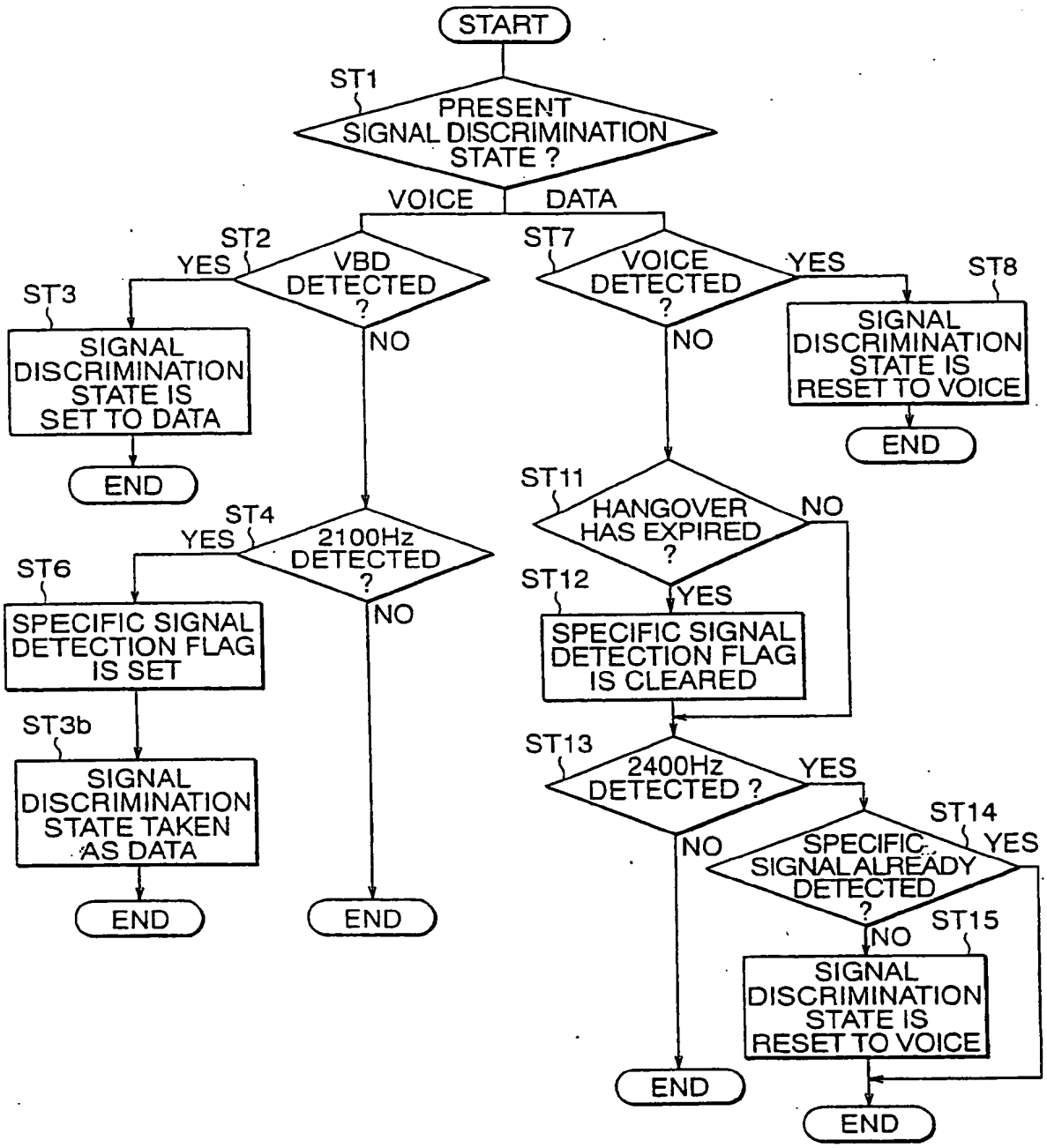

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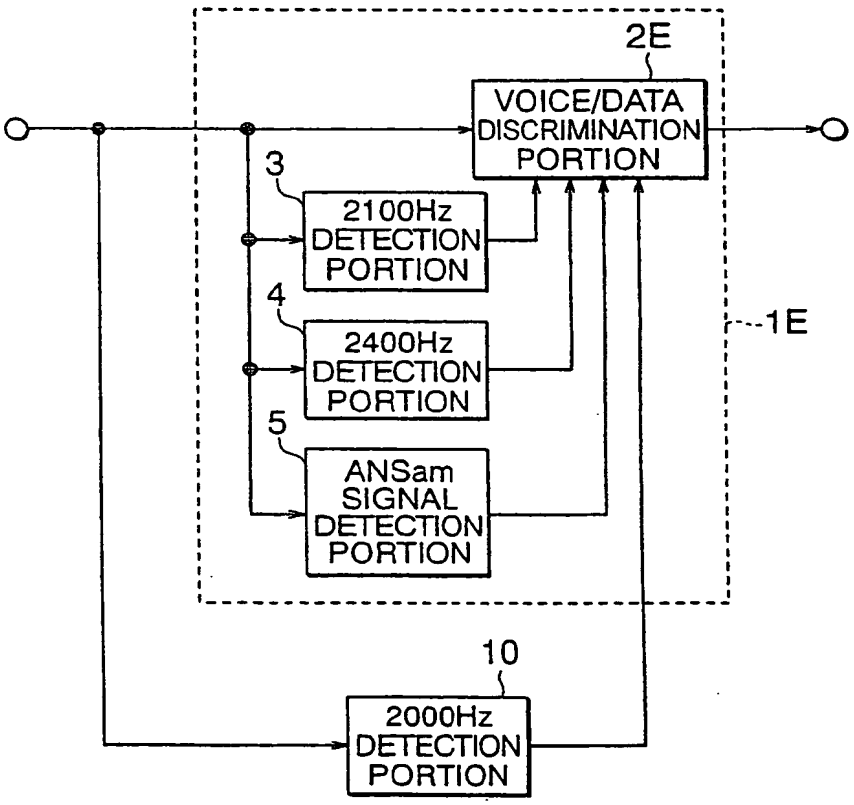
FIG. 13



1E : SIGNAL DISCRIMINATION PORTION

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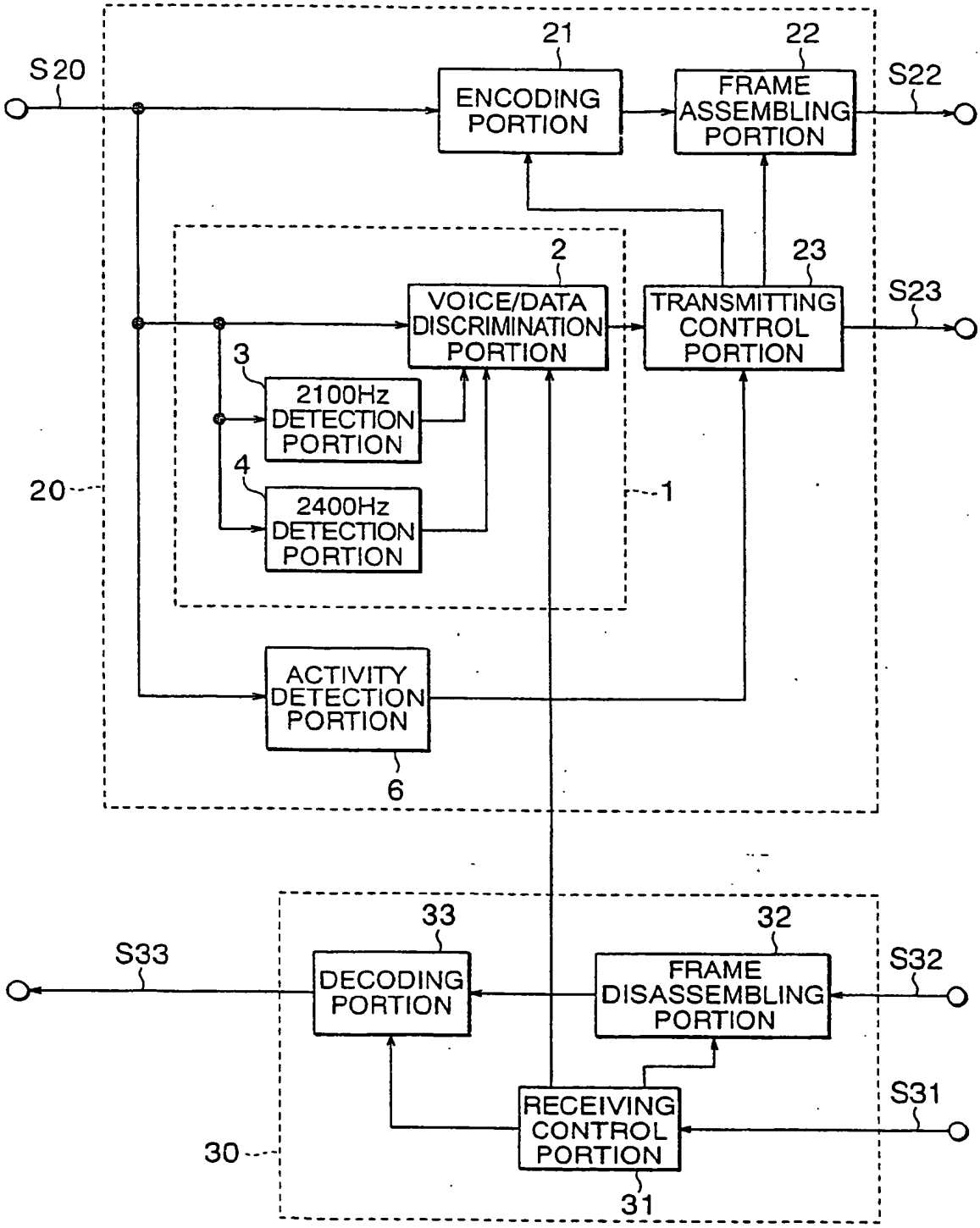
FIG. 15



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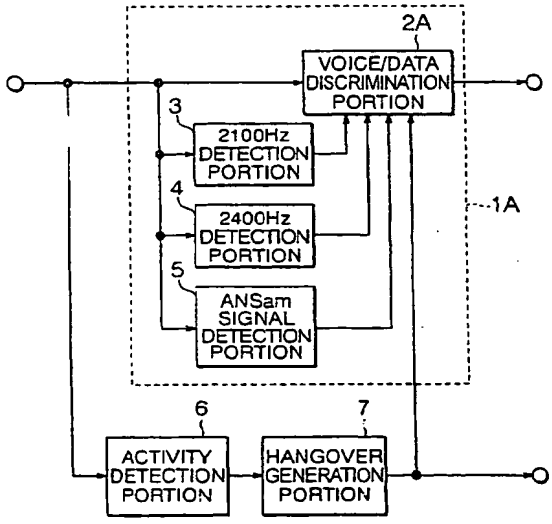
(54) Method, apparatus and transmission equipment for signal discrimination

(57) The signal discrimination result is prevented from becoming the "voice" during the transmission of the modem signal by the V.34 modulation system.

The 2400 Hz detection portion for detecting the 2400 Hz tone signal from the input signal, the ANSam signal detection portion for detecting the specific signal used in the start-up procedure of the V.34 modem signal from the input signal and the voice/data discrimination portion for classifying the type of the input signal based on the outputs of the 2400 Hz detection portion and the ANSam signal detection portion are provided, and in the case where the specific signal has not been detected, the signal discrimination result in the case where the 2400 Hz tone signal is detected is made to be the voice state, while in the case where the specific signal has been detected, the signal discrimination result in the case where the 2400 Hz tone signal is detected is not made to be the voice state.

FIG. 1



1A : SIGNAL DISCRIMINATION PORTION

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The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

14-04-2005

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5493609 A	20-02-1996	US 5365577 A	15-11-1994
		US 5164982 A	17-11-1992
		AU 3000495 A	09-02-1996
		WO 9602104 A1	25-01-1996
		US 5583922 A	10-12-1996
		AU 4226393 A	29-11-1993
		CA 2134758 A1	11-11-1993
		EP 0646303 A1	05-04-1995
		WO 9322869 A1	11-11-1993
		WO 9426056 A1	10-11-1994
		US 5444770 A	22-08-1995
		US 5473676 A	05-12-1995
		US 5557316 A	17-09-1996
		CA 2091259 A1	28-03-1992
		WO 9206550 A1	16-04-1992
JP 9312705 A	02-12-1997	JP 3199648 B2	20-08-2001
		DE 19711996 A1	06-11-1997
		GB 2317083 A ,B	11-03-1998
		IL 120407 A	31-12-1999
		US 6147973 A	14-11-2000
US 6147973 A	14-11-2000	JP 3199648 B2	20-08-2001
		JP 9312705 A	02-12-1997
		DE 19711996 A1	06-11-1997
		GB 2317083 A ,B	11-03-1998
		IL 120407 A	31-12-1999
US 5787116 A	28-07-1998	NONE	
US 5999898 A	07-12-1999	NONE	

EPO FORM P0459

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BNSDOCID: <EP_____1239653A3_I_>